

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
US Department of Commerce  
United States Patent and Trademark  
Office, PCT  
2011 South Clark Place Room  
CP2/5C24  
Arlington, VA 22202  
ETATS-UNIS D'AMERIQUE  
in its capacity as elected Office

Date of mailing (day/month/year) 17 May 2001 (17.05.01)	
International application No. PCT/NL00/00644	Applicant's or agent's file reference BO 42693 YK
International filing date (day/month/year) 11 September 2000 (11.09.00)	Priority date (day/month/year) 15 September 1999 (15.09.99)
Applicant VAN GEIJLSWIJK, Petrus, Johannes	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
12 April 2001 (12.04.01)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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## PATENT COOPERATION TREATY

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REC'D 18 JAN 2002

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BO 42693 RZw	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NL00/00644	International filing date (day/month/year) 11/09/2000	Priority date (day/month/year) 15/09/1999
International Patent Classification (IPC) or national classification and IPC B65C9/00		
Applicant HEINEKEN TECHNICAL SERVICES B.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  12/04/2001	Date of completion of this report  16.01.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Visentin, M  Telephone No. +49 89 2399 2614 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NL00/00644

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-10 as originally filed

**Claims, No.:**

16 as originally filed

1-15 with telefax of 19/12/2001

**Drawings, sheets:**

1,2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/NL00/00644

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	1-8, 14, 15
	No:	Claims	9
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	10-13
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/NL00/00644

1. There are in the present application two independent claims, number 1 and 9, respectively.
2. Document FR-A-2 686 862 is considered to represent the most relevant state of the Art for the matter defined in claim 1 and 9, respectively. It discloses a method for applying a label to an object from which the subject-matter of claim 1 differs by the following combination of features:
  - a) - the support belt and the label are urged over an edge in order to reduce the adhesion between the support belt and the label;
  - b) - both the support belt and the label are fed towards the application head;
  - c) - the front side of the label is provided with an adhesive, the adhesive force between the label and the object during application exceeding the adhesive force between the label and the support belt.
- 2.1 The combination of the characterizing features a), b), c) above is neither known from, nor rendered obvious by, the available prior Art and is considered as involving an inventive step.
- 2.2 Thus the subject-matter of claim 1 satisfies the criterion set forth in Article 33(3) PCT because it involves an inventive step.
3. With respect to the independent claim 9 (device) it is observed the following. The wording of the claim should have been partly amended to put it in conformity with the subject-matter of claim 1. After appropriate amendments it could be seen, as for claim 1, as involving an inventive step (Article 33(3) and Rule 65(1)(2) PCT). The subject-matter as it appears at present cannot be considered as novel over the prior art represented by the document FR-A-2 686 862.
4. The dependent claims define additional features of the invention.
5. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background Art disclosed in document FR-A-2 686 862 is not mentioned in the description, nor is this at least one document identified therein.

11  
ClaimsREPLACED BY  
ART 34 AMDT

1. Method for applying an imprint or label (6) to an object, such as a container (2, 20), in which:

5           - a support belt (5) bearing separated labels (6) is fed to an application head (3), the labels (6) being attached to the support belt (5) by a support side and being provided with an adhesive on an application side,

          - an object (2, 20) is fed to the application head (3), and

          - the adhesive of the label (6) is brought into contact with the object (2, 20)

10       with the aid of the application head (3), characterized in that

          - the support belt (5) is deformed upstream of the application head (3) in such a manner that the adhesion of the support side of the label (6) to the support belt (5) is reduced.

2. Method according to claim 1, characterized in that the support belt (5) is  
15       deformed by moving the support belt (5) over an edge or a strip (7).

3. Method according to claim 1 or 2, characterized in that the support belt (5) is deformed over an angle which is between 45° and 90°.

4. Method according to claim 1, 2 or 3, characterized in that the label (6) substantially comprises ink and adhesive.

20       5. Method according to one of the preceding claims, characterized in that the label (6) is heated when it is applied to an object (2, 20).

6. Method according to one of the preceding claims, characterized in that the support belt (5) is deformed in the vicinity of the application head (3), at least the upstream end of the label (6) being clamped between the object (2, 20) which is to be  
25       printed and the application head (3) before the support belt (5) is deformed at the downstream end of the label (6).

7. Method according to one of the preceding claims, characterized in that the label (6) and the support belt (5) are fed past the application head (3), the adhesive of the label (6) being brought into contact with the object (2, 20) as a result of the  
30       application head (3) acting on the support belt (5).

8. Method according to one of the preceding claims, characterized in that the support belt (5) is removed upstream of the application head (3).

9. Method according to one of the preceding claims, characterized in that the support belt (5), downstream of the application head (3), is moved past a removal strip (11), in such a manner that labels (6) which have remained on the support belt (5) are removed from the support belt (5) by the removal strip (11).

5           10. Device, clearly intended for carrying out the method according to one of the preceding claims, which device comprises:

- a frame,

- an application head (3) which is attached to the frame and is displaceable with respect to the frame,

10           - means for feeding a support belt (5) towards the application head (3), separated labels being arranged on the support belt (5), and

- means (10) for removing the support belt (5) from the application head (3) towards a removal roll, characterized in that the device comprises a bending member (7) which is arranged upstream of the application head (3), in or in the vicinity of the path of the support belt (5), which bending member (7) comprises a contact surface which extends substantially transversely with respect to the direction of movement of the support belt (5), in such a manner that the support belt (5), in use, moves over the contact surface of the bending member (7).

15           11. Device according to claim 10, characterized in that the bending member (7) is positioned in the vicinity of the application head (3).

20           12. Device according to claim 9, 10 or 11, characterized in that the distance between the bending member (7) and the application head (3) is adjustable.

          13. Device according to one of claims 10-12, characterized in that the application head is designed as a roller (3).

25           14. Device according to one of claims 10-12, characterized in that the application head is designed as a brush (15, 31).

          15. Device according to one of claims 10-12, characterized in that that side of the application head (30) which faces towards the objects (2, 20) to be printed is provided with a substantially curved recess.

30           16. Device according to one of claims 10-15, characterized in that the device comprises a removal strip (11) which is positioned downstream of the application head (3) in the path of the support belt (5).

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## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>BO 42693 YK</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/NL 00/ 00644</b>	International filing date (day/month/year) <b>11/09/2000</b>	(Earliest) Priority Date (day/month/year) <b>15/09/1999</b>
Applicant <b>HEINEKEN TECHNICAL SERVICES B.V. et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 03 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

**METHOD AND DEVICE FOR APPLYING AN IMPRINT OR LABEL TO AN OBJECT**

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

2



None of the figures.



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00644

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65C9/00 B65C1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 930 237 A (HEINEKEN TECH SERVICES) 21 July 1999 (1999-07-21) column 8, line 40 -column 9, line 20; figures 3,6 ---	1-5,7,8, 10,11,13
X	US 3 450 590 A (MERS HERBERT LA) 17 June 1969 (1969-06-17) column 3, line 9 - line 23; figures 1,2 ---	1-5,10, 11
X	US 5 783 018 A (LUSTIG STEVEN ET AL) 21 July 1998 (1998-07-21) column 2, line 11 - line 35; figure 2 ---	1-4,10, 11
A	US 4 555 299 A (MAZUR EDWARD J ET AL) 26 November 1985 (1985-11-26) ---	
A	FR 2 686 862 A (ETIQUETAGE STE FRANCAISE) 6 August 1993 (1993-08-06) ---	
	-/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&amp;\* document member of the same patent family

Date of the actual completion of the international search

21 December 2000

Date of mailing of the international search report

03/01/2001

Name and mailing address of the ISA

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Authorized officer

Müller, C

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00644

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 35291 A (BLOM PATRICK J ;ROSENS ERWIN A (NL); HEINEKEN TECH SERVICES (NL);) 25 September 1997 (1997-09-25) ----	
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A	WO 99 08936 A (TRINE LABELING SYSTEMS INC) 25 February 1999 (1999-02-25) ----	
A	DE 28 53 033 A (DELEATE DIETER) 12 June 1980 (1980-06-12) -----	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00644

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			AU 1946697 A	10-10-1997
			AU 1946797 A	10-10-1997
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US 4555299	A	26-11-1985	US 4502910 A	05-03-1985
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			CH 668953 A	15-02-1989
			DE 3539396 A	10-07-1986
			FR 2575439 A	04-07-1986
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Information on patent family members

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00644

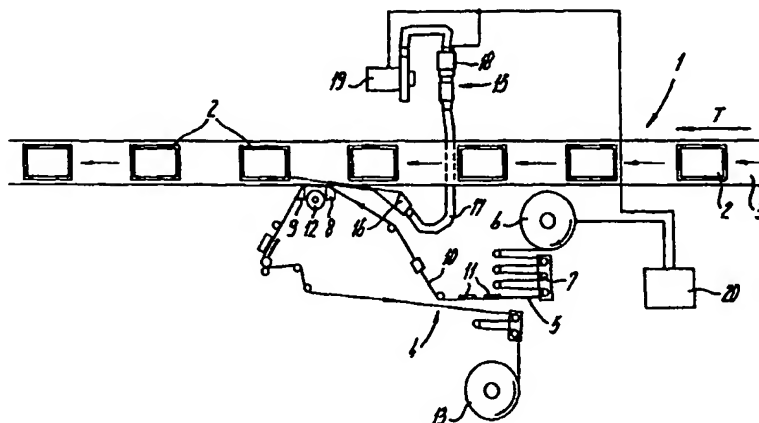
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		BR 9811207 A	25-07-2000
		EP 1005427 A	07-06-2000
DE 2853033 A	12-06-1980	NONE	



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B65C 9/18</b>		<b>A1</b>	(11) International Publication Number: <b>WO 99/67139</b>
			(43) International Publication Date: 29 December 1999 (29.12.99)
(21) International Application Number: PCT/NL99/00391 (22) International Filing Date: 24 June 1999 (24.06.99) (30) Priority Data: 1009473                      24 June 1998 (24.06.98)                      NL (71) Applicant (for all designated States except US): HEINEKEN TECHNICAL SERVICES B.V. [NL/NL]; P.O. Box 530, NL-2380 BD Zoeterwoude (NL). (72) Inventor; and (75) Inventor/Applicant (for US only): VAN GEILSWIJK, Petrus, Johannes [NL/NL]; Koperwieklaan 6, NL-2251 NV Voorschoten (NL). (74) Agents: DE BRUIJN, Leendert, C. et al.; Nederlandsch Octrooibureau, Scheveningseweg 82, P.O. Box 29720, NL-2502 LS The Hague (NL).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report.	

(54) Title: DEVICE FOR APPLYING A DECORATION TO A CRATE



## (57) Abstract

The invention relates to a device for applying a decoration to containers such as, for example, crates, bottles or cans. The decoration comprises an image transfer label supplied to the containers on a carrier strip. The carrier strip is pressed laterally, by means of a pressure roller, against the containers, which are fed past the pressure roller. A heating device, such as, preferably, a hot air blower, heats the image transfer label on the application side of the carrier strip. Preferably, a flat stream of air is blown, by the hot air blower, against the line of contact between the image transfer label and the container. As a result of the use of highly local heating of the application side of the carrier strip according to the present invention, activation of the image transfer label is obtained without the carrier strip or the surface of the container being heated to a substantial extent. As a result, undesired stretch in the carrier strip is prevented and the temperature of the image transfer label can remain relatively low, so that the quality of the inks is retained and complete transfer to the containers is possible. The pressure roller is also able to operate at relatively low temperatures, so that a long life thereof is obtained. As a result of the highly local heating on the application side, the contact time required for transfer of the image transfer label is reduced substantially, so that a high throughput is possible.

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## DEVICE FOR APPLYING A DECORATION TO A CRATE

The invention relates to a device for applying a decoration to containers, comprising

- a conveyor for feeding containers in a transport direction,
- 5 - a feed device for feeding a carrier strip to an application station, which carrier strip is provided on an application side, which faces the conveyor, with an image transfer label to be transferred to the containers, wherein
- for receiving the carrier strip, the application station comprises a guide for supporting the carrier strip, such that the carrier strip makes an acute angle with respect to the direction
- 10 of transport, as well as a pressure element for pressing the carrier strip against the containers.

A device of this type is disclosed in International Patent Applications nos. WO 97/35290, WO 97/35291, WO 97/35292 and European Patent Application no. 96200780.3 in the name of the Applicant. These applications describe a device for applying washable

15 image transfer labels which are applied from a paper or polypropene carrier strip to containers such as, for example, plastic crates. With this device the crates are fed to the application station on a conveyor. The carrier strip with the image transfer labels thereon is unwound from a stock roll and fed over a heated pressure roller in the application station, which pressure roller is movable to and fro perpendicularly to the direction of transport of

20 the crates. Prior to transfer of the image transfer label from the carrier strip, during which the image transfer label is removed from the carrier strip while heat and pressure are supplied through the pressure element, the surface of the crates is treated with a flame to give said surface the correct surface tension. Furthermore, a pre-heating step is carried out on the crates by means of a quartz heating element in order to bring the crates to the correct

25 temperature, the heat-activatable adhesive of the image transfer labels being activated.

Especially when applying heat-activated image transfer labels, which, for example, are provided with heat-activated adhesive, to heat-sensitive products such as, for example, PET bottles or plastic crates, the problem arises that the surface of the containers cannot be heated too much because of the resulting deformation. However, the carrier strip, which can

30 have been made of paper or plastic, can likewise not be heated too much since this can damage the carrier strip or the image transfer label and undesirable stretch can occur, which leads to incorrect alignment of the image transfer labels with respect to the containers to be printed. Furthermore, too great a supply of heat to the carrier strip will lead to the inks of



the image transfer label becoming soft, so that the image transfer label is not detached as a single element from the carrier strip. Furthermore, it has been found that the temperature range of the pressure roller is restricted in connection with the life of this roller, which becomes shorter when higher temperatures are used.

5 It is therefore an aim of the present invention to provide a device of the abovementioned type with which the supply of heat to the carrier strip is controlled such that a rapid and complete transfer of the image transfer label to the containers is possible, without the containers having to be preheated to relatively high temperatures. A further aim of the present invention is to provide a device of this type with which the contact time  
10 between the pressure element and the carrier strip can be reduced, with which the risk of overheating the carrier strip is avoided, with which the stretch of the carrier strip remains within accurately defined limits and with which complete transfer of the image transfer label can take place in a reliable and reproducible manner. It is also an aim of the present invention to provide a device of the abovementioned type with which a long life of the  
15 pressure element is ensured.

To this end the device according to the present invention is characterised in that a heating device is incorporated close to the pressure element to dispense heat to the application side of the carrier strip in a preheating region of the carrier strip located upstream of the pressure element.

20 By subjecting the application side of the carrier strip to highly local heating at the time of transfer, just before the image transfer label is brought into contact with the relevant container by the pressure element, activation of (the adhesive of) the image transfer label is obtained without the carrier strip or the surface of the container having to be heated to any substantial extent. As a result undesirable stretch in the carrier strip is prevented and the  
25 temperature of the image transfer label can remain relatively low, so that the quality of the inks is retained and complete transfer to the containers is possible. The pressure roller is also able to operate at relatively low temperatures, said roller, for example, not having to be heated at all or being heated only to a slight extent. Furthermore, as a result of the highly local heating on the application side of the carrier strip for complete transfer of the image  
30 transfer label, the contact time required between the pressure element and the carrier strip is shortened, so that the throughput rate can be increased appreciably, for example to 500 containers per minute or more.

The heating device can have been constructed as a heated plate, rod or roller that is

accommodated between the containers and the carrier strip. Preferably, however, the heating device is equipped to heat the image transfer labels without mechanical contact with the carrier strip and comprises, for example, a radiant heating element or a burner.

The containers can be wooden, plastic or metal crates, trays or other packaging means which are generally used in the packaging industry, as well as plastic or glass bottles and the like. The invention can also be applied to metal cans such as are generally used in the drinks industry.

The image transfer label on the carrier strip can be a washable image transfer label as described in the abovementioned prior art or can be permanently applied to the container as described in European Patent EP-B 0 441 858. In this context a setting top coat can be applied on top of the image transfer label after applying the image transfer label to the container.

Preferably, the heating device according to the invention comprises a hot air blower directed towards the guide. It has been found that very controlled local heating of the image transfer label can take place by means of a directed stream of air. By using a slit-shaped outflow nozzle only the surroundings of the image transfer label in the immediate vicinity of the line of contact between the image transfer label and the container, at the location of the pressure roller, are heated. The amount of heat can also be controlled very accurately in a simple manner by adjusting the volume of the stream of air, which can be switched off rapidly if the feed of the carrier strip is interrupted. Increased safety for the operators is achieved as a result since the hot air blower cools down to ambient temperature very rapidly after switching off. The outflow nozzle of the hot air blower is relatively compact and can be mounted in a simple manner between the carrier strip and the conveyor.

The conveyor for the containers can comprise a linear conveyor or can be a rotary conveyor which rotates counter to the direction of transport of the carrier strip, the containers, rotating about their own axis in the direction of transport, being supported on the conveyor, as described in International Patent Application WO 97/13645.

In a further embodiment of the device according to the invention, the pressure element is movable to and fro transversely to the direction of transport, between a retracted position and an application position located close to the conveyor for the containers. This embodiment is characterised in that the hot air blower dispenses the stream of air at an acute blowing-angle with respect to the direction of transport. When the pressure element is in the retracted position, said stream of air will be at least partially directed along the carrier strip

so that heating of the carrier strip is substantially reduced at that point in time. When the carrier strip is moved by the pressure element towards the container and the air gap between the container and the carrier strip decreases, the stream of air will come into contact with the application side of the carrier strip and heat this. When the carrier strip has been placed  
5 in contact with the container, the stream of air is blown into the enclosed space that is delimited by the carrier strip and the container, so that substantial local heating of the image transfer label takes place, especially along the contact line between the image transfer label and the container, which contact line faces the stream of air.

The blowing angle of the stream of air is between 15° and 45°, preferably between  
10 25° and 30°. The blowing angle of the stream of air can be adjustable by means of, for example, arranging the outflow nozzle such that it is hingeable or by means of suspending said outflow nozzle from a flexible hot air supply tube. The air temperature is, for example, between 100 °C and 350 °C. The heating element and the fan in the hot air blower are preferably set up outside the range of the carrier strip, for example at a side of the conveyor  
15 which is located opposite the application station. The heating device according to the invention is connected to a control unit which switches off the heating device if the feed of the carrier strip is interrupted.

One embodiment of the device according to the present invention will be explained in more detail by way of example with reference to the appended drawing. In the drawing:

20 Figure 1 shows a diagrammatic plan view of a device for applying an image transfer label to crates,

Figure 2 shows a detail of the heating device according to Figure 1 with the pressure element in the retracted position and

25 Figure 3 shows the device according to Figure 2 with the pressure element in the application position.

Figure 1 shows a device 1 for applying an image transfer label to containers, such as crates 2, which are fed on a conveyor belt 3 in the direction of transport T. The crates 2 are fed to an application station 4 where an image transfer label is applied to the wall of the crates 2. To this end a carrier strip 5 is unwound from a stock reel 6 and conveyed via a  
30 tensioner 7 to guides 8, 9. The carrier strip 5 is provided on its application side 10 with an image transfer label 11 in the form of patterns a uniform distance apart which have to be transferred from the carrier 5 to the crates 2. The image transfer label 11 can have been provided, on the side facing the crates 2, with a heat-activated adhesive. A pressure roller

12 is arranged between the guides 8, 9, which pressure roller is movable to and fro transversely to the direction of transport T by means of a hydraulic device, which is not shown in the figure. In Figure 1 the pressure roller 12 is shown in its retracted position, so that the carrier strip runs free from the pressure roller and is able to pass over the guides 8, 9. The empty strip of carrier material is wound on a take-up reel 13 downstream of the pressure roller 12.

To heat the image transfer labels 11 on the application side 10 of the carrier strip 5, a hot air blower 15 is incorporated which has an outflow nozzle 16 that is arranged between the conveyor belt 3 and the carrier strip 5, close to the guide 8 located upstream. The outflow nozzle 16 is connected via a flexible tube 17 to a heat gun 18 and to a fan 19. The outflow nozzle 16 is suspended from a flexible section 21 of the tube 17 of the device 15 so that the position of the outflow nozzle 16 relative to the direction of transport can be varied. The heating device 15 and the stock reel 6 are connected to a microprocessor 20 which switches off the heating device 15 if the feed of the carrier strip 5 from the stock reel 6 is interrupted.

As is shown in Figure 2, the outflow nozzle 16 is of slit-shaped construction, the direction of the slit being transverse to the plane of the drawing.

The blowing angle  $\alpha$  of the stream of air dispensed by the outflow nozzle 16 with respect to the direction of transport T is about 30°. The width of the outflow nozzle 16 is, for example, 10 mm for a length of approximately 500mm. The pressure of the air dispensed by the outflow nozzle 16 is approximately 1.5 bar. The outflow nozzle is provided with a number of holes, located along a line, which have a diameter of 2mm, which holes have been made every 10mm in order to obtain a flat air flow. As shown in Figure 2, when the pressure roller 12 is in the retracted position the stream of air is blown along the carrier strip 5 so that in this case the latter is not heated.

As shown in Figure 3, when the carrier strip 5 is in the application position the pressure roller 12 presses against a crate 2 passing by the pressure station 4. In this case the stream of air from the nozzle 16 impinges on the contact line between the carrier strip 5 and the crate 2, which is located perpendicular to the plane of the drawing. As a result, highly advantageous local heating of the image transfer label 11 on the application side 10 of the carrier strip 5 can take place.

In one embodiment polyethene crates are heated to a temperature of between 60 °C and 70 °C upstream of the heating device 15. The crates are fed at a speed of 31 cm/s or 40

crates per minute past the application station 4. During this operation the carrier strip 5 is pressed against the crates 2 by a pressure roller 12 at a temperature of 110 °C - 150 °C. The carrier strip 5 carries image transfer labels, for example of the type as supplied by Zweckform. A stream of air of 600 l/min at a temperature of 100 °C - 350 °C is blown under a pressure of 80 mbar against the carrier strip 5 by the heating device 15. Accurate transfer of the image transfer labels 11 from the carrier strip 5 to the crates 2 is possible with a very high throughput and at relatively low temperatures of the pressure roller 12.

Although the invention has been described with reference to the application of an image transfer label to plastic crates, the invention is not restricted to this and can be employed for a wide variety of packaging materials known in the packaging industry. Furthermore, in place of a hot air blower it is also possible to use other heating devices such as heating devices which make contact with the application side of the carrier strip 5 or radiant heating devices such as, for example, heat lamps. Furthermore, it is also possible to omit the guides 8, 9, so that the carrier strip is continuously supported by the pressure roller

15 12.

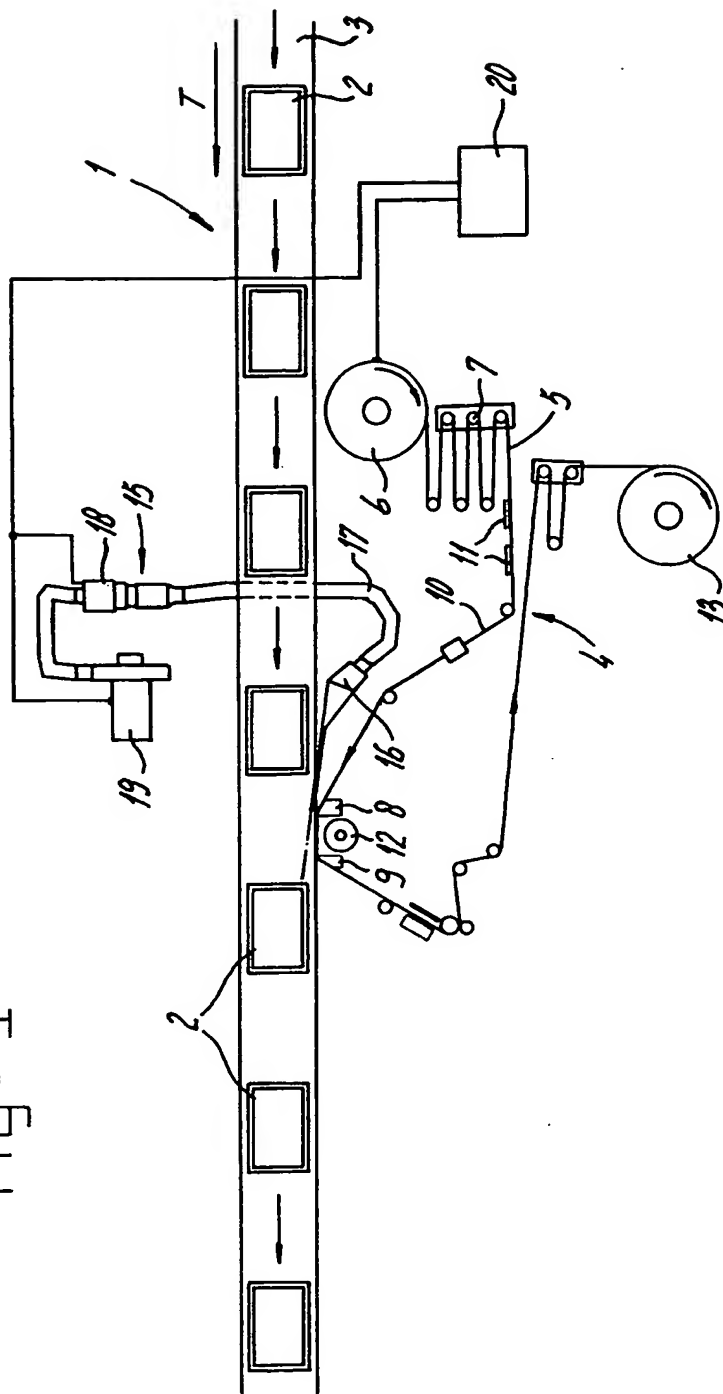
## Claims

1. Device (1) for applying a decoration to containers (2), comprising
  - a conveyor (3) for feeding containers in a transport direction (T),
  - 5 - a feed device (6,7,13) for feeding a carrier strip (5) to an application station (4), which carrier strip (5) is provided on an application side (10), which faces the conveyor (3), with an image transfer label (11) to be transferred to the containers,
  - an application station (4) for receiving the carrier strip (5), the carrier strip (5) making an acute angle with respect to the direction of transport (T), comprising a pressure element
  - 10 (12) for pressing the carrier strip (5) against the containers (2), characterised in that a heating device (15) facing the application side (10) is incorporated close to the pressure element (12) to dispense heat to the application side (10) of the carrier strip (5) in a preheating region of the carrier strip (5) located upstream of the pressure element (12).
- 15 2. Device according to Claim 1, characterised in that the application station (4) comprises a guide (8) for supporting the carrier strip, the heating device (15) being positioned upstream of the guide (8), in the vicinity thereof.
3. Device (1) according to Claim 1 or 2, characterised in that the heating device (15) is
- 20 equipped to heat the application side (10) of the carrier strip (5) without mechanical contact with the carrier strip.
4. Device according to Claim 1, 2 or 3, characterised in that the heating device (15) comprises a hot air blower (16, 17, 18, 19) facing the pressure element (12).
- 25 5. Device (1) according to Claim 4, characterised in that an outflow nozzle (16) of the hot air blower (16, 17, 18, 19) is positioned between the carrier strip (5) and the conveyor (3).
- 30 6. Device (1) according to Claim 5, characterised in that the hot air blower (16, 17, 18, 19) has a slit-shaped outflow nozzle (16), so that a relatively narrow stream of air which is at least equally as wide as the image transfer label (11) on the carrier strip (5) is formed in the longitudinal direction of the carrier strip (5).

7. Device (1) according to Claim 4, 5 or 6, wherein the pressure element (12) is movable to and fro, transversely to the direction of transport (T), between a retracted position and an application position located close to the conveyor (3) for the containers (2), characterised in that the hot air blower (16, 17, 18, 19) dispenses the stream of air at an acute blowing angle ( $\alpha$ ) with respect to the direction of transport (T) of the containers, which stream of air is directed at least partially along the carrier strip (5), without making contact therewith, when the pressure element (12) is in the retracted position and terminates in the gap between a relevant container (2) and the pressure element (12) when the pressure element (12) is in the application position.
8. Device (1) according to Claim 7, characterised in that the blowing angle ( $\alpha$ ) of the stream of air is between 15° and 45°, preferably between 25° and 30°.
9. Device (1) according to Claim 7 or 8, characterised in that the blowing angle ( $\alpha$ ) of the stream of air is adjustable.
10. Device (1) according to one of Claims 4 to 9, characterised in that the temperature of the stream of air dispensed by the hot air blower (16, 17, 18) is between 100 °C and 350 °C, preferably between 100 °C and 200 °C.
11. Device (1) according to one of Claims 4 to 10, characterised in that the heating device (16, 17, 18) contains a fan (19) and a heating element (18) which are arranged outside the range of the carrier strip (5), as well as a flexible tube (21) which is connected to the fan (19) and terminates in the outflow nozzle (16).
12. Device (1) according to one of the preceding claims, characterised in that the heating device (18) is connected to a control unit (20) for switching off the heating device (18) if the feed of the carrier strip (5) is interrupted.
13. Device (1) according to one of the preceding claims, characterised in that the pressure element (12) is heated.

1/2

fig-1





2/2

fig-2

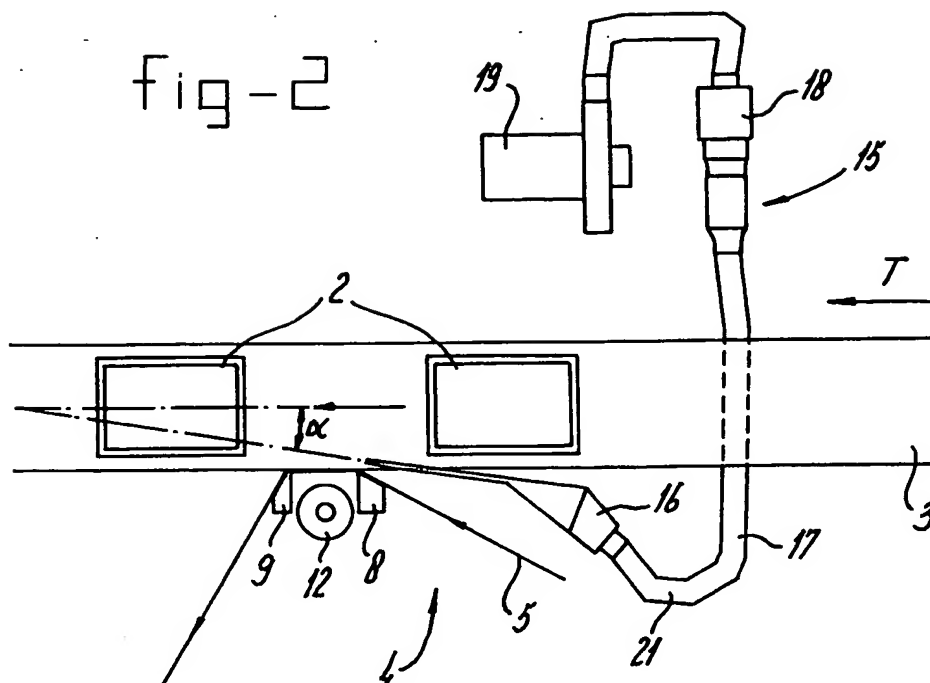
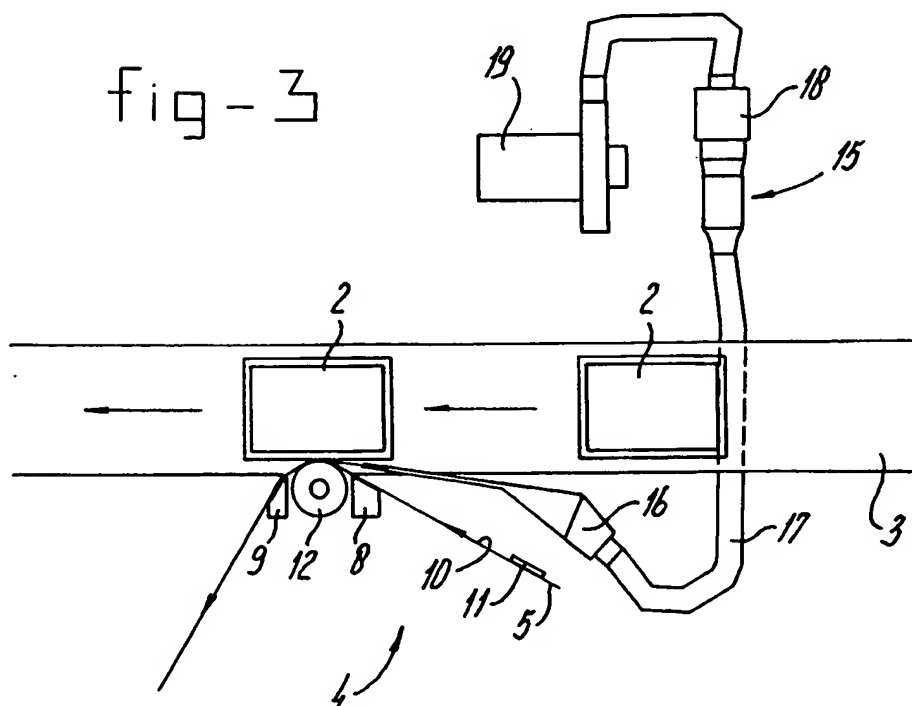


fig-3



# INTERNATIONAL SEARCH REPORT

International Application No

PC./NL 99/00391

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65C9/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Patent family members are listed in annex.

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Information on patent family members

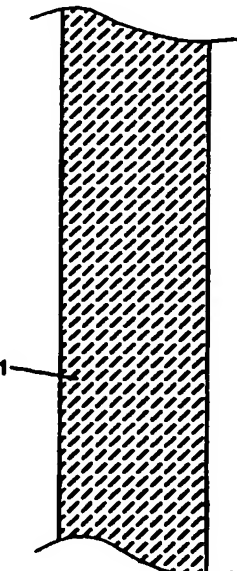
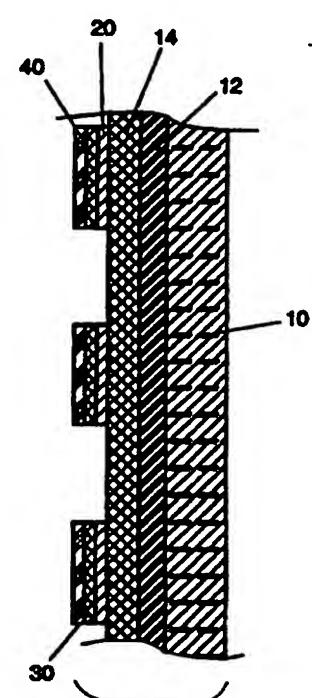
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<p>(21) International Application Number: PCT/NL97/00140 (22) International Filing Date: 19 March 1997 (19.03.97) (30) Priority Data: 96200780.3 20 March 1996 (20.03.96) EP (34) Countries for which the regional or international application was filed: AT et al. (71) Applicants (for all designated States except US): HEINEKEN TECHNICAL SERVICES B.V. [NL/NL]; Burgemeester Smeetsweg 1, NL-2382 PH Zoeterwoude (NL). BRANDT TECHNOLOGIES, INC. [US/US]; 8 Park Street, Windsor, NY 13865 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): BLOM, Patrick, Johannes [NL/NL]; Mahlerstraat 14, NL-2324 JG Leiden (NL). ROSENS, Erwin, Anton [NL/NL]; Janvossensteeg 30 A, NL-2312 WE Leiden (NL). BRANDT, Thomas, Lynn [US/US]; 403 Flanders Hill Road, Windsor, NY 13865 (US). WILKENS, Daniel, Nathaniel [US/US]; P. O. Box 335, Freeville, NY 13068 (US). (74) Agent: SMULDERS, Th., A., H., J.; Vereenigde Octrooibureaux, Nieuwe Parklaan 97, NL-2587 BN The Hague (NL).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>	
<p>(54) Title: LABELLED, RETURNABLE PLASTIC CRATE</p>		
<p>(57) Abstract</p> <p>The invention is directed to a returnable plastic crate provided on at least one surface with an ink only label that is removable without destructive treatment of the said surface, said label being adhered to said at least one surface by an activated adhesive layer.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;">   </div> <p style="text-align: center;">LABEL &amp; SUBSTRATE EXPLODED VIEW</p>		

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Title: Labelled, returnable plastic crate.

#### BACKGROUND OF THE INVENTION

The present invention is directed to a returnable plastic crate provided with at least one ink only label, to  
5 a process for applying an ink only label to a polymeric surface and to a system for using returnable crates.

More in particular the present invention is directed to a technique for labelling returnable plastic crates and more specifically to a technique for applying  
10 decorative promotional and/or informational labels to plastic crates. Still more particularly, the invention is directed to a technique for using a label composite which applies only the inks of the graphics to a polymeric substrate, a method for applying the label inks to the  
15 crate, a method of strengthening of same through a post coating encapsulation of the inks in conjunction with a post treatment, and finally the ability to remove the composite ink label without altering the crate, i.e. without destructive treatment of the substrate surface, so that it  
20 can be relabelled.

Plastic crates are presently labelled in one of three different ways. The predominant method is to silk screen a non-removable permanent image prior to end user use. Such labels offer a highly durable finish with 2 or 3  
25 color availability to promote enclosed product at the consumer level. This technique offers limited colors, lacks the improved graphics that other labelling techniques offer, is not flexible in its ability to have graphic changes to meet market strategies leading to large inventories of  
30 obsolete units, tends to show signs of wear after only four (4) trips (typical crate life expected at 60 return trips)

and is relatively expensive as compared to other label techniques.

A second way encompasses glueing printed paper labels to the plastic crates at the time of filling and sealing. This type of label offers an almost unlimited art potential. However, this type of label offers little resistance to label damage from handling and exposure to moisture and will not survive the washing procedures required of a returnable container thereby requiring relabelling.

A third, and more recently developed crate labelling technique, is that of applying a thin pressure sensitive label. This is a widely used method but has limited service life, it is difficult to remove when desired and is comparatively expensive.

The need for the returnable crate is a direct result of industry preference and government legislation with regard to returnable (refillable) containers in various parts in the world in lieu of one way packaging. In this type of recycling environment a whole new market has been created for the handling of packaged beverage containers. This is presently true of both refillable PET and glass bottle containers. Certain countries, Europe in particular, have invested large sums of money in the creation of distribution systems that rely heavily on the returnable crate concept.

Typically the only product presentation in such a recycling (refillable) market is that which can be printed on the exterior of the crate. Due to handling, space and storage considerations the only marketing, name brand, promotional, UPC code or other informational presentation is that which is printed on the exterior of the crate. The reason is that typically the crates are stacked at commercial outlets such as grocery stores with only the side and end panels showing. As such, the presentations on the said panels of the crates are the only distinguishing features from one product to another.

In the use of returnable crates it would be very interesting to be able to use one uniform crate for various different products or brands. However, this is only possible if there exists an easy and inexpensive method of providing  
5 an image or imprint on the crate, which is also easily removed after the crate is returned to the bottling line for refilling.

On the other hand, it is important that the label, image or imprint on the crate is durable, especially during  
10 transport and storage, more importantly is durable even when subjected to humid conditions.

Accordingly it is an object of the invention to provide a returnable plastic crate having an imprint, label or image on at least one of its surfaces, which is durable,  
15 scratch, wear, weather and moisture resistant during use, but which is easily removable during crate washing upon return to the factory.

It is another object of the present invention to offer a method of labelling plastic containers such as  
20 beverage bottle crates.

It is a further object of this invention to label the plastic container at the time of beverage bottle loading so that the label is indicative of the special contents.

It is also an object of the invention that the  
25 label on the plastic container shall be impervious to all handling contact and ambient storage conditions both outdoor and indoor.

It is also an object of the invention that the label, if desired, be readily and completely removed in the  
30 standard crate washer used when the plastic container is returned to the beverage plant for refilling.

It is also an object of the invention that the properties of the label with respect to removing it can be controlled, so that the label will not be removed or damaged  
35 in standard crate washing operations, but only under specific, more severe crate washing operations.



It is an object of the present invention that the labels incorporate a full range of graphics, from a simple one color up to a full photographic reproduction.

Finally it is also an object that the method be  
5 simple and low cost.

#### SUMMARY OF THE INVENTION

These and other objects are achieved by the  
10 returnable plastic crate according to the present invention, which is provided on at least one surface with an ink only label that is removable by caustic washing, said label being adhered to said at least one surface of said crate by an activated adhesive layer.

15 In this respect the term "ink only label" is used to define a label that does not have a paper or plastic backing, but which comprises an image layer of ink, which is directly applied to a surface. Quite often the surface remains at least partly visible through the image layer. An  
20 ink only label may conveniently be applied to a surface by image transfer, using a reverse printed label.

The label to be used in accordance with the present invention is essentially based on an ink image without a backing material. The ink image is adhered to the  
25 surface of the crate by an adhesive, and the surface of the image may be protected by a protective layer.

The present invention provides a distinct improvement over the prior art systems, which were based on paper or plastic labels. In order to remove these labels  
30 expensive high pressure equipment was necessary, especially in case labels were required on adjacent sides of the crate. Removal of the labels through simple soaking, as in the present invention, is virtually impossible. Further the residues of the labels have a tendency to clog the crate  
35 washing equipment.

The system of the present invention is less expensive and environmentally more friendly, as the residues

of the ink only label are easily recovered from the soaking water and recycled.

The present invention also provides the possibility to use the label for scanning possibilities, for example by including a UPC (bar) code therein, which code may be used to define the recipient, the contents or any other information that is suitable. The system also allows the producer to reduce the stock of crates, as it is no longer necessary to keep stock crates of all brands or types. The system according to the present invention makes it possible for a producer to have only one type of crate for each type of material, for example bottle, irrespective of the brand of the material. This makes it possible to reduce the stock of crates tremendously. Of course the reduction would be even greater if the whole industry in a country or continent would decide to use the system.

In such a case many different producers (bottlers) of beverage containers would share common crates, and yet maintain individual market identification via the present invention. At the same time an improved, user friendly and costs effective recycling system would be perfected. Such a system could be utilized on a national or even a multi national level.

According to a preferred embodiment a transparent protective coating is present on top of the ink only label. This coating improves the resistance of the label against environmental influences. Generally the material of the protective coating is compatible with the material of the ink. More preferably all materials, adhesive, ink and protective coating are based on acrylate polymers. In order to improve the durability of the label further, it may be advantageous that after application of the label (and the coating) one or more treatments are given. These treatments provide a coalescence of the materials of the various layers, resulting in improved service life, however, without deteriorating the wash-off behaviour.

By careful selection of the composition of the label, the use of a protective coating and the nature of the post treatment, it is possible to steer the properties of the label, especially with respect to the behavior during  
5 crate washing. More specifically, it is possible to design the system in such a way, that the label is removed during standard crate washing. This means that after each return to the beverage filling plant, the label is removed and a new, optionally different, label may be applied. On the other  
10 hand, the label may be made so durable that it will not be removed or damaged during standard crate washing, but only in case a specific, severe washing operation is used. In this way the label is not permanent, however it has all the advantages of a permanent imprint, for example a silk  
15 screen, without the disadvantages thereof, such as the high costs thereof in terms of investments and energy requirements, inflexibility and low number of colors.

The selection of the adhesive to be used in adhering the label image to the crate surface will at least  
20 partly depend on the intended service life of the label, one-way or multiple trip use. Of course the adhesive must remain removable during crate washing. The adhesive must have been activated prior to or during application of the image to the crate. An easy and generally preferred method  
25 of applying the image is through the use of heat activatable adhesives, that have been applied to the image in the form of a reverse printed label. Other methods include the use of adhesives that can be activated through radiation, chemicals, electron-beam, micro-wave, UV and the like. It is  
30 also possible to use adhesives that can be activated through photo initiation, humidity, enzymatic action, pressure or ultra-sonic treatment.

It is preferred to use adhesives that are activated either by heat or by pressure. The latter case  
35 also encompasses adhesives, which require pressure to remain adhered, although they may have some tackiness without pressure.

The adhesive is preferably present on the back side of the image before it is applied to the crate surface. However, it is also possible to apply the adhesive to the crate prior to transferring the image. Another possibility  
5 is the use of inks in the image that have the adhesive incorporated therein.

The protective layer, if used, may be applied after the image has been transferred to the crate, for example using a conventional roller coater. In the  
10 alternative the protective layer may be part of the image material as it is transferred

The present invention also provides for a method of applying an ink only label to a polymeric surface, more in particular to a crate surface.

15 The method of the present invention comprises in its broadest form:

- providing the surface, preferably moving at a uniform rate,
- presenting a reverse printed label on a substrate,  
20 separable from its substrate and preferably over printed with an activatable adhesive, and
- transferring the label ink to the polymeric surface.

The label is applied to the polymeric surface which has preferably been surface treated and temperature  
25 stabilized. The label is applied by transferring the ink from its film substrate utilizing a roller, a pad, a doctor blade or an air knife. Preferably a heated roller is used under pressure. As indicated previously, the adhesive may either be present on the label or may be on the polymeric  
30 surface. The adhesive has to be activated prior to or during transfer. depending on the type of adhesive, the activation method will differ. The skilled person will be aware which type of activation will be required. In case of a pressure sensitive adhesive, pressure will be applied during  
35 transfer. If a heat activatable adhesive is used, it is preferred to preheat the polymeric surface, optionally in combination with a heated transfer system, such as a roller.

In a preferred embodiment a heat activatable adhesive is used, in combination with a heat-pretreatment of the polymeric surface. As the heat activated adhesive printed over the ink becomes tacky, the ink is released from the film substrate and adheres to the plastic surface.

The labels may be supplied on a roll, from which the images are transferred to the substrate, optionally in combination with a cutting operation. It is also possible to provide a stack of separate labels, using a suitable application device.

Depending on the requirements on the image it may be preferred to have a protective coating on top thereof. This coating may have been applied as part of the reverse printed label during image transfer. In a preferred embodiment the protective coating is applied after image transfer, for example by the use of a roller coater.

In that situation, the transfer surface is coated with a thin layer of protective coating, such as an acrylic wax. Subsequently a post treatment, preferably one or more heat treatments are given. With this treatment the label materials coalesce and without being bound thereto, it is assumed that the durable bond obtained thereby is affected through inter diffusion of the adhesive and plastic surface.

In case the image has to be more durable, for example for multi-trip use, it is preferred to use either a more durable coating, such as a urethane, and/or a prolonged, more severe post treatment.

It is well-known that polymeric materials and especially high density polyethylene in particular, are difficult materials to bond with adhesives. This invention describes a specific method of surface treatment to ensure adhesive bonding that is fast and economical.

An important discovery described in the invention is the coalescing of the label materials and surface coating by exposing the labelled area to very high temperatures for a few seconds to increase durability and resistance to moisture. This process alters the label composite from a

series of adhered layers which are easily dissociated with immersion in water for 2 or more hours to a coalesced matrix of label adhesive, label inks and outer coating. During the heating the adhesive material inter diffuses with the plastic surface. The simultaneous coalescing and inter diffusion of this preferred embodiment of the invention result in a very durable label matrix. Resistance to water immersion can be varied from a few hours to several weeks by varying the time of exposure and the resultant temperature.

It should be noted, that the resistance to water immersion of an untreated label according to the invention may be sufficient as it never completely loses its bonding with the polymeric surface. The bonding only weakens; drying restores the bonding strength to its original value.

Having achieved the required label durability, it is also necessary to remove the label after it has served its purpose of identifying the contents of the container prior to consumption. The empty plastic containers and beverage bottles are returned to the beverage plant for refilling. The plastic containers are washed. During this wash the label must either be completely removed, or remain on the surface undamaged, depending on the situation (one-way or multi-trip).

In the former case, the heat treated adhesive used to bond the ink matrix, while durable in water, breaks down in the washing solution, preferably hot caustic, enabling the label and adhesive to be completely removed. The label residue is filtered out of the caustic solution. In the latter case the label is only removed when the washing conditions are changed to remove the label, for example by using a prolonged soaking and/or a stronger caustic solution, optionally in combination with the use of high pressure jets (liquid or gas).

Alternative methods for removing the images without a destructive treatment of the substrate (polymeric) surface comprise chemical removal (solvents), ultra sonic, sub-cooling, heating, brushing, enzymatic treatment, vacuum

treatment, peeling and radiation, such as UV. Combinations of various methods are of course also possible.

It may be desirable that the processing equipment be arranged so that the plastic containers are labelled in-line during the normal progression through the beverage facility, so that the crate label matches the bottle contents.

#### DESCRIPTION OF THE DRAWINGS

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Figure 1 Heat Transfer Label

Figure 2 Surface Treatment and Temperature Stabilization

Figure 3 Label Application and Ink Transfer

Figure 4 Coating Application

15 

Figure 5 Post Treatment

Figure 6 Specific embodiment of image transfer process

#### DETAILED DESCRIPTION OF THE INVENTION

20

The preferred embodiment of the label and application according to the present invention will be described first with references to Figure 1 which shows the plastic container (1) and the label positioned for application. The label is printed on a film substrate (10) which may be any thin film, but in the case described is polypropylene of 2 mils thickness. (14) is an acrylic coating which may or may not be employed, depending on the type and source of the film available. (12) is a release material which coats the film. In the case of the invention it is silicone which is applied at the time of film manufacture. (20) represents all the printed ink material. Depending on the label graphics and opacity requirements the ink materials may be as many as five (5) different colors in one or more layers, some of which may overlay another. (30) and (40) represent two (2) layers of adhesive to indicate the build up of adhesive from 0.5 to 1.5 pounds per

ream, depending on the labelled surface uniformity and rigidity of the container being labelled.

Upon application, all of the printed materials are transferred from the silicone release coated film substrate.

5 The printed ink materials are vinyl or acrylic resin based, colored with temperature and ultra violet stable pigments. In the case of white ink, titanium dioxide is the pigment of choice. Pigment particle size ranges from three (3) to five (5)  $\mu\text{m}$ . The printed adhesive is a urethane modified acrylic  
10 with an initial tack temperature of 175°F (80°C). This initial tack temperature is very important to the plastic labelling process because it determines the required plastic surface temperature at the time of transfer. With the particular plastic container being labelled, there is no  
15 support of the inside surface, hence it is desired to maintain the plastic below 200°F (93°C) to avoid distortion of the surface by reaching its point of deformation during the label transfer.

The label application method will now be described  
20 in the order of progression. Figure 2 shows the technique of surface treatment and temperature stabilization. For adhesion of two polymeric materials to occur, many factors must be considered such as cleanliness, pressure, temperature, contact time, surface roughness, movement  
25 during bonding and adhesive film thickness. An additional important consideration is the critical surface tension. The commonly accepted method of measuring the critical surface tension is with a Dyne solution, which is well known. For most adhesive applications the critical surface tension of  
30 polyethylene is 31 Dynes per centimetre. A series of tests were performed which demonstrated for best adhesion of the adhesive previously described to the polyethylene surface, a treatment level of 60 to 70 Dynes per centimetre was necessary. Further testing of commercially available  
35 equipment showed that flame treatment optimized both capital cost, operating cost and time required to achieve the required critical surface treatment.



For the adhesive to achieve and maintain tack quickly it is necessary to heat the polyethylene container before the label adhesive is in contact with it. To avoid deforming the container, it is desirable not to heat the surface over 200°F (93°C). As the surface temperature leaving the flame treatment is approximately 125°F (52°C), it is necessary to heat the surface approximately 75°F (24°C). Here again, many options are available for heating. Hot air, additional flame heaters, gas fired infra-red panels and electric ceramic panels were all tested and found to be either too slow or difficult to control. It was found that an electrically heated flat fused quartz emitter plate with zonal band control for localized label transfer would provide maximum free air transmission of infra-red energy without the effects of ambient environmental factors. With an emissivity of 0.9 for polyethylene a desired temperature of between 1650°F (900°C) to 1725°F (940°C) will emit the most efficient wavelength (2.5 to 3.2  $\mu\text{m}$ ) of infra-red energy for peak absorption. The unit tested was rated at 60 watts per square inch. The time to heat the polyethylene surface the necessary 75°F (24°C) was 4.5 seconds at a distance from the emitter plate of 2.5 centimetres.

Figure 3 illustrates the method of label application whereby the printed ink materials are transferred from the polypropylene film substrate to the polyethylene surface utilizing the tactile characteristics of the heat activated adhesive to overcome the bond of the ink layer 14 to the corona treated silicone coating 12. The factors that influence transfer are time to contact, temperature during contact and film tension during contact particularly tension on the film after ink release. Pressure roll diameter is also a factor but not a variable. For this application the roll diameters are 38 mm. The rollers were made of silicone rubber over a steel core, with rubber durometer ranging from 50 Shore A to 80 Shore A. It should be noted that distortion (flattening) of the rubber roller is less at the higher durometer, consequently the contact

area is less and the transfer pressure is greater. This is important at the higher line speeds where contact time is minimized. Thus a crate moving 18.3 meters per minute (60 feet per minute) past a roller of 38 mm diameter will have a  
5 contact time of 1 millisecond per 1 degree of roller rotation where there is no roller distortion.

Roller pressure is provided by an air cylinder activated by a conventional solenoid valve which in turn is operated by two (2) proximity switches, one to advance the  
10 roller and the other to retract. Other means, such as mechanical linkage are obvious and will not listed here. The pressure is distributed across the length of the cylinder and for this particular ink, transfer ranges from 12 to 17 kilograms per centimetre of roller length. See Figure A.

15 Thus the invention results in the film being advanced at exactly the same rate as the crate is moving past the roller by virtue of the heat activated adhesive adhering to the high energy crate surface. The pressure roller, which rotates freely, maintains the same tangential  
20 speed as the linear speed of the film and crate. Thus the ink is transferred completely and without distortion.

For purposes of fast and complete adhesion the pressure roller is molded to a hollow core. Suspended within the hollow core is a resistance heater operated through a  
25 controller. The heating element, rated at 500 W, will maintain the roller surface at any predetermined temperature. For purposes of the invention, the roller surface temperature range between 250°F and 370°F (120°C and 190°C). See Figure B.

30 Many silicone coated polymer films may be used for the printed substrate, High temperature films such as polyester may be operated in continuous contact with the heated roller. Low temperature films such as polypropylene must be prevented from contacting the heated roller during  
35 pauses in the labelling operation. To accomplish this, film guides are used to support the film when the roller is retracted. The guides are mounted to maintain a clearance of

approximately 13 mm between the guides and the labelled surface. At the same time the roller is retracted approximately 13 mm behind the film. By maintaining those clearances, stretching and distortion of the film such as polypropylene is avoided. High temperature films would not require the guides.

It has also been discovered that film tension, especially on the film exit side of the roller, is important to complete ink transfer. Through trials, it was found a continuous tension of approximately 2.5 kilograms is useful. This is achieved through a spring loaded dancer arm and roller.

Conventional nip rollers and stepping motor are used to advance the film to the next label and position it accurately, using a printed mark to trigger an optical scanning device.

Protection of the ink against scratching by casual handling as well as insuring its weatherability when subjected to outdoor storage is achieved with the application of an acrylic based wax water emulsion as shown in figure 4. This is applied by a roll applicator which is supplied from a wet roller with a controlled amount of coating. Control is achieved with a doctor blade. The coating extends well past the edges of the ink pattern and seals the edges from intrusive moisture.

The final processing step is to coalesce the layers of the coating, label ink, and adhesive and also to inter diffuse the adhesive layer with the polyethylene substrate as shown in figure 5. This discovery was made through extensive trials of many heating systems. As flame treatment was discovered to be the best technique that would provide the required surface energy for label adhesion, so it was discovered that flame treatment of the label and coating composite was the best technique that would develop the required water immersion durability without sacrificing mechanical properties or altering the visual characteristics of the applied label, or distorting the polypropylene crate.

In figure 6 the presently developed best mode of application of the invention is shown.

It will be appreciated that further modifications could be made to the embodiment disclosed above, while still  
5 obtaining many of the advantages and without departing from the spirit and scope of the invention as defined in the appended claims.

## CLAIMS

1. Returnable plastic crate provided on at least one surface with an ink only label that is removable from the surface without destructive treatment of the said surface, said label being adhered to said at least one surface by an  
5 activated adhesive layer.
2. Crate according to claim 1, wherein a transparent, protective coating has been applied over said ink layer.
3. Crate according to claim 1 or 2, wherein the adhesive layer has been activated by heat.
- 10 4. Crate according to claim 1-3, wherein the adhesive layer loses its adhesion when treated with an aqueous alkaline solution.
5. Crate according to claim 1-4, wherein at least part of the surface consists of polyethylene.
- 15 6. Crate according to claim 1-5, wherein the adhesive and the ink only label, optionally together with the protective layer, have been coalesced.
7. Crate according to claim 1-6, wherein an polymeric ink, preferably a vinyl- or an acrylic-based ink has been  
20 used.
8. Crate according to claim 1-7, wherein a heat activatable adhesive has been used, preferably a urethane acrylic, with an initial tack temperature of 90°C maximum.
9. Crate according to claim 1-8, wherein the  
25 protective coating is based on an acrylic wax.
10. Process for applying an ink only label to a polymeric surface, said process comprising:
  - providing the surface, preferably moving at a uniform rate,
  - 30 - presenting a reverse printed label on a substrate, separable from its substrate and preferably over printed with an activatable adhesive, and
  - transferring the label ink to the polymeric surface.

11. Process according to claim 10, wherein the polymeric surface is activated prior to presenting the reverse printed label.
12. Process according to claim 11, wherein the  
5 activation is a flame treatment.
13. Process according to claim 10-12, wherein the said adhesive is heat activatable and the surface is heated prior to presenting the reverse printed label.
14. Process according to claim 10-13, wherein the  
10 transferred label is coated with a transparent, protective coating.
15. Process according to claim 10-14, wherein the surface, optionally together with the protective coating is given one or more heat treatments, such as flame treatments,  
15 to coalesce the applied materials.
16. Process according to claim 10-15 for the production of a crate according to any one of the claims 1-9.
17. Returnable crate system, comprising providing a  
20 crate according to any one of the claims 1-9, for transport of material, such as bottles, to outlets, washing the crate upon return to filling facilities, preferably with an aqueous, hot caustic solution, during which washing the ink only label is completely removed, applying an ink only label  
25 to at least one surface of the crate and filling the crate again with material.

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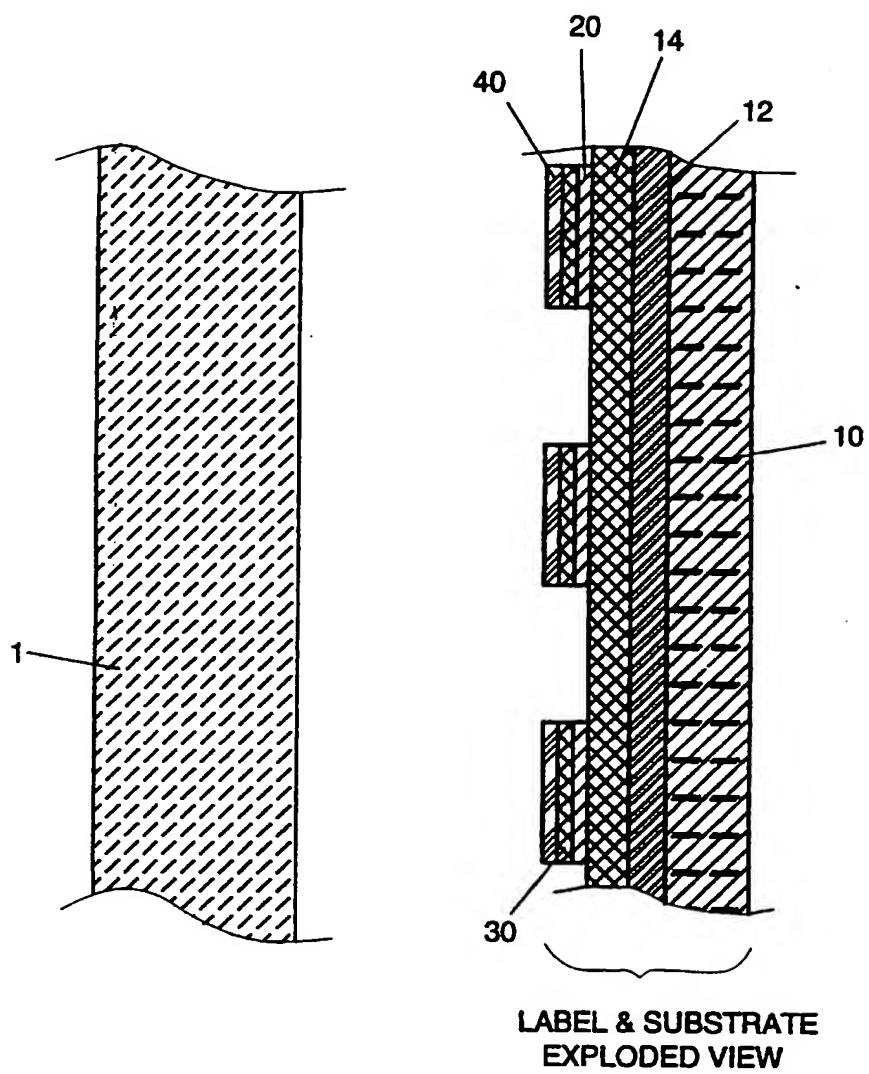


FIG. 1

27

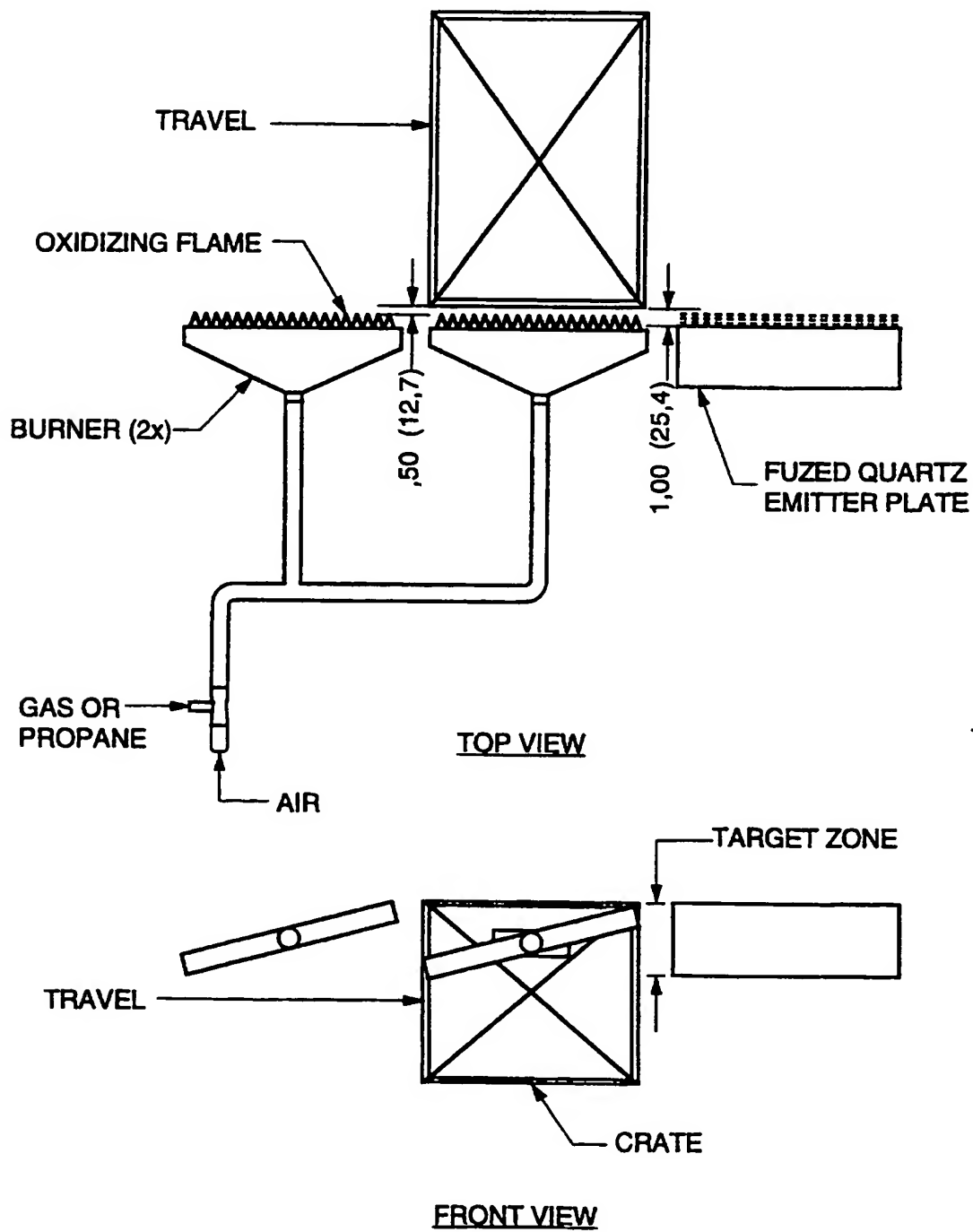
FLAME TREATMENT AND TEMPERATURE STABILIZATION

FIG. 2



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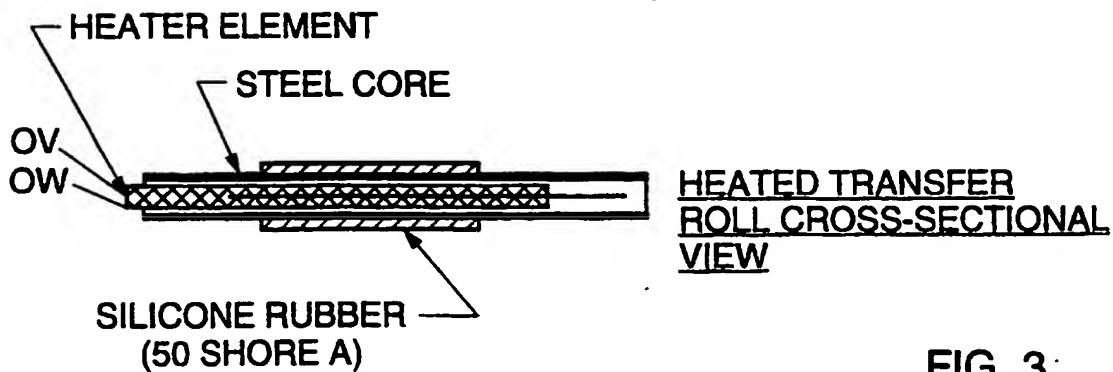
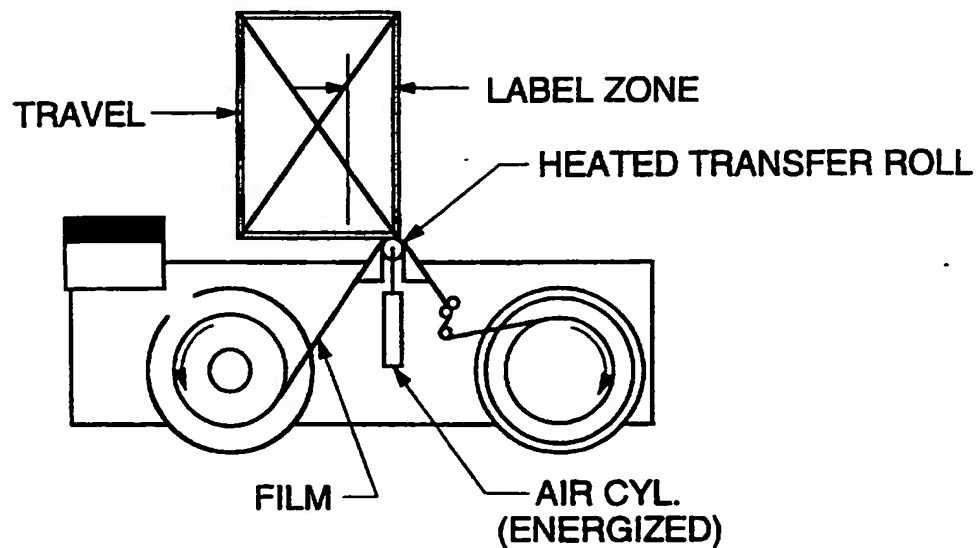
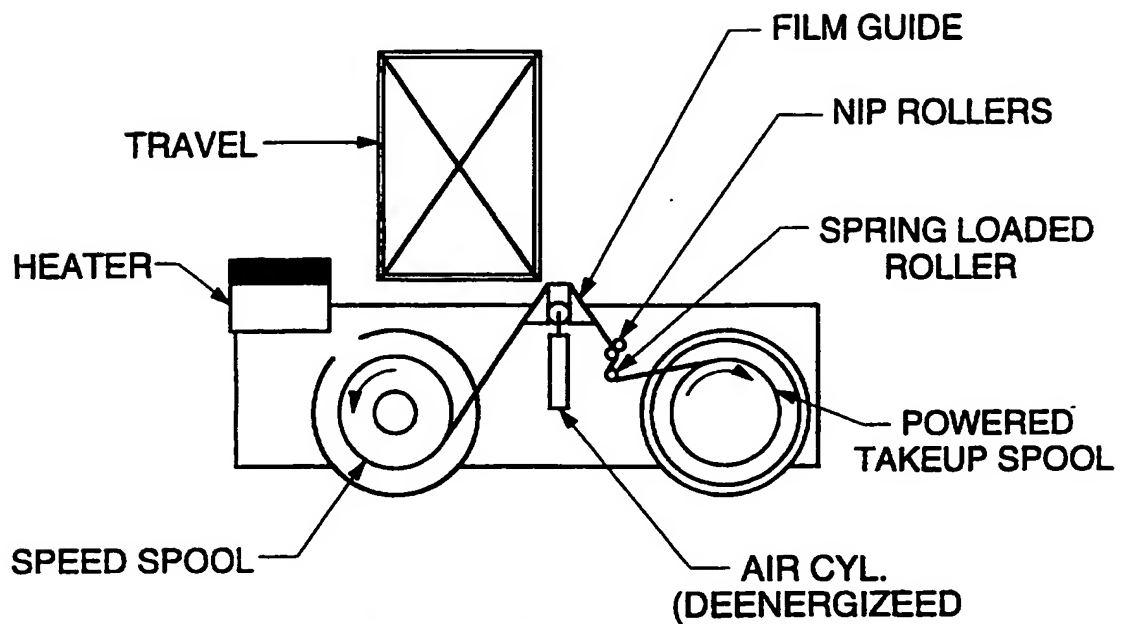
LABEL INK TRANSFER

FIG. 3

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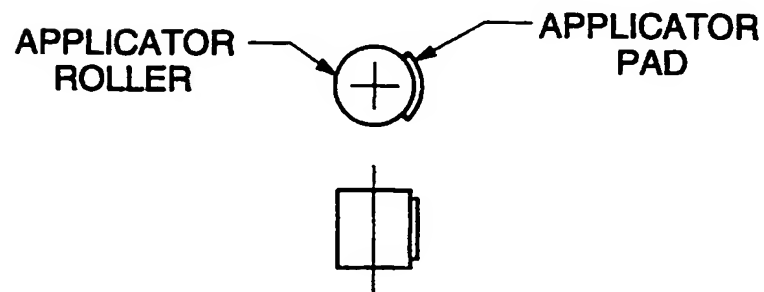
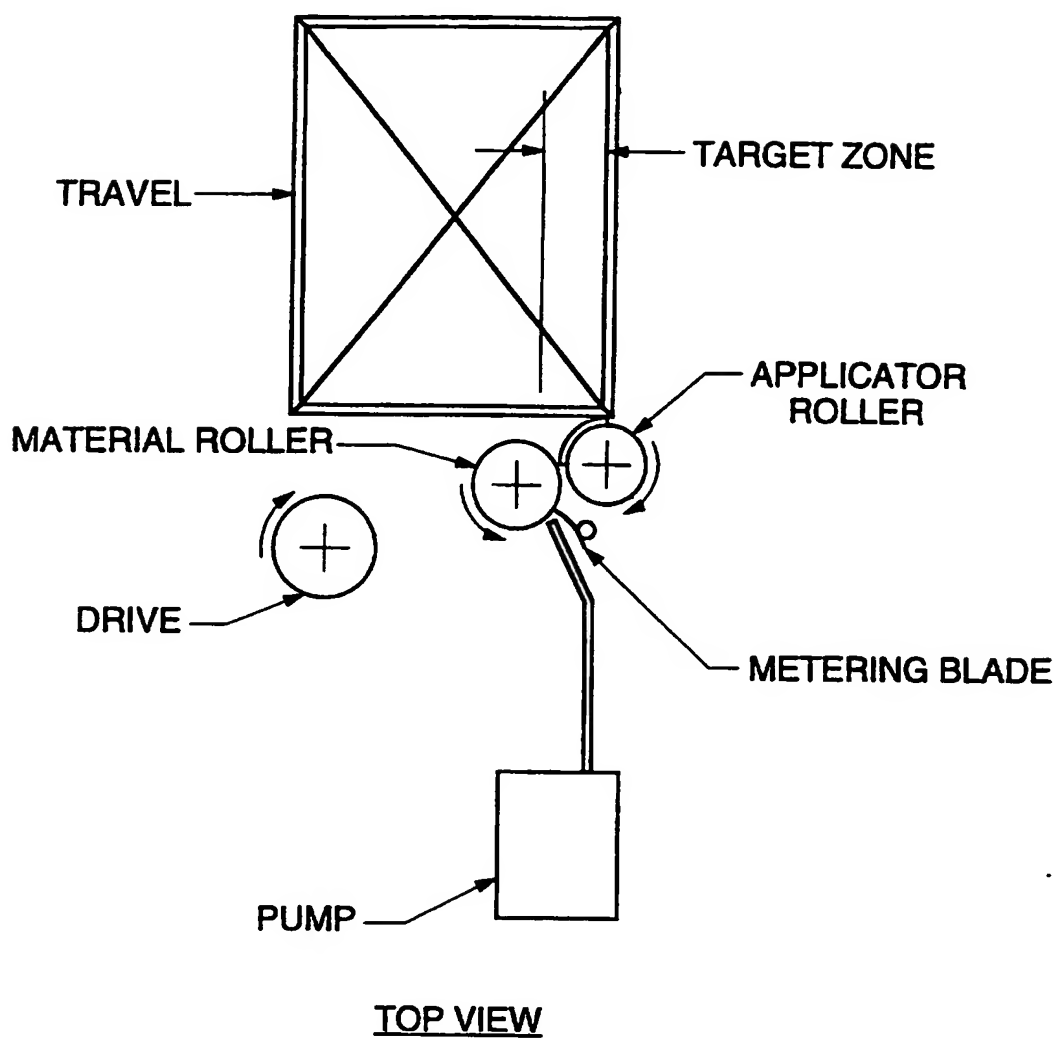
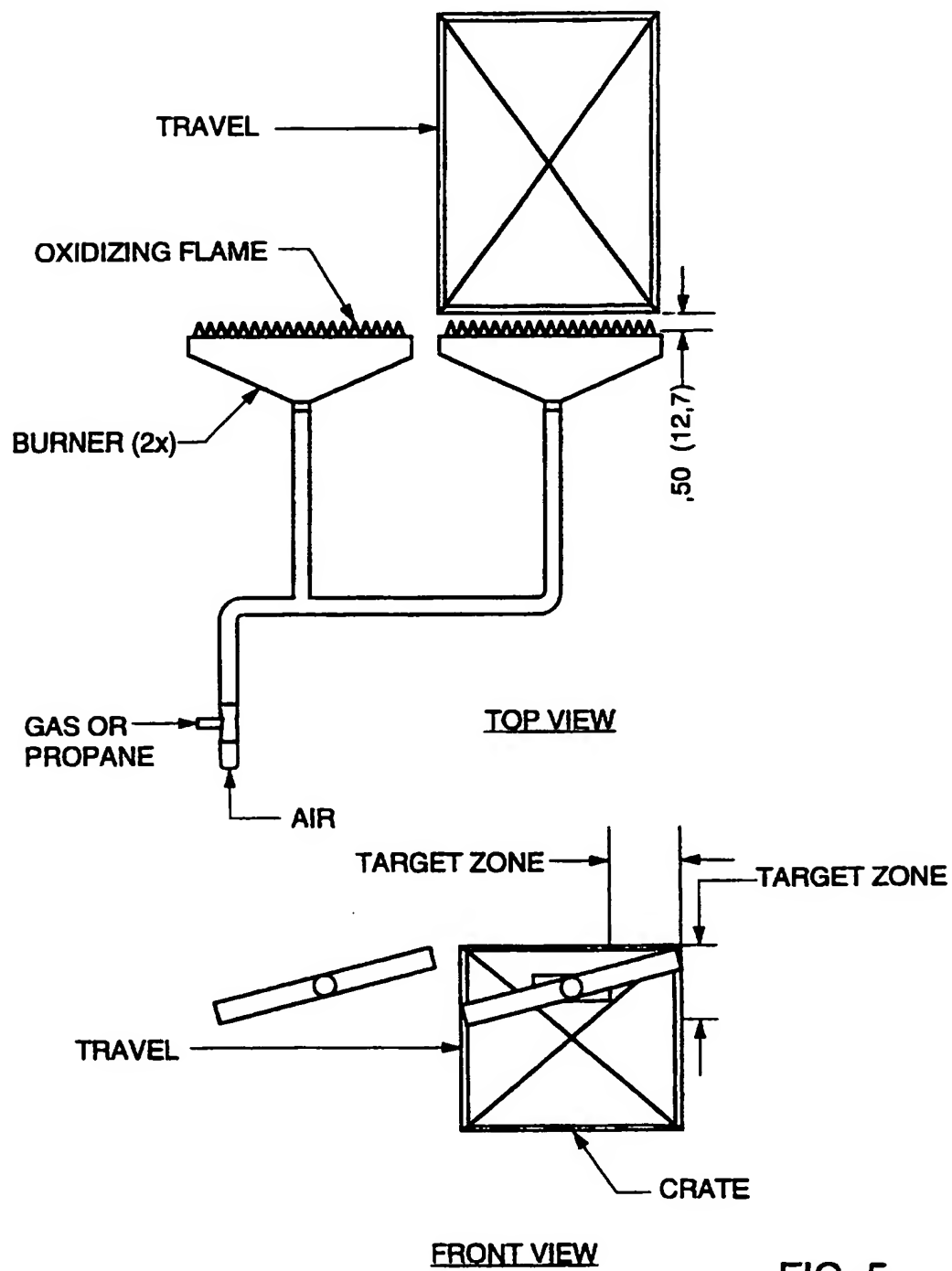
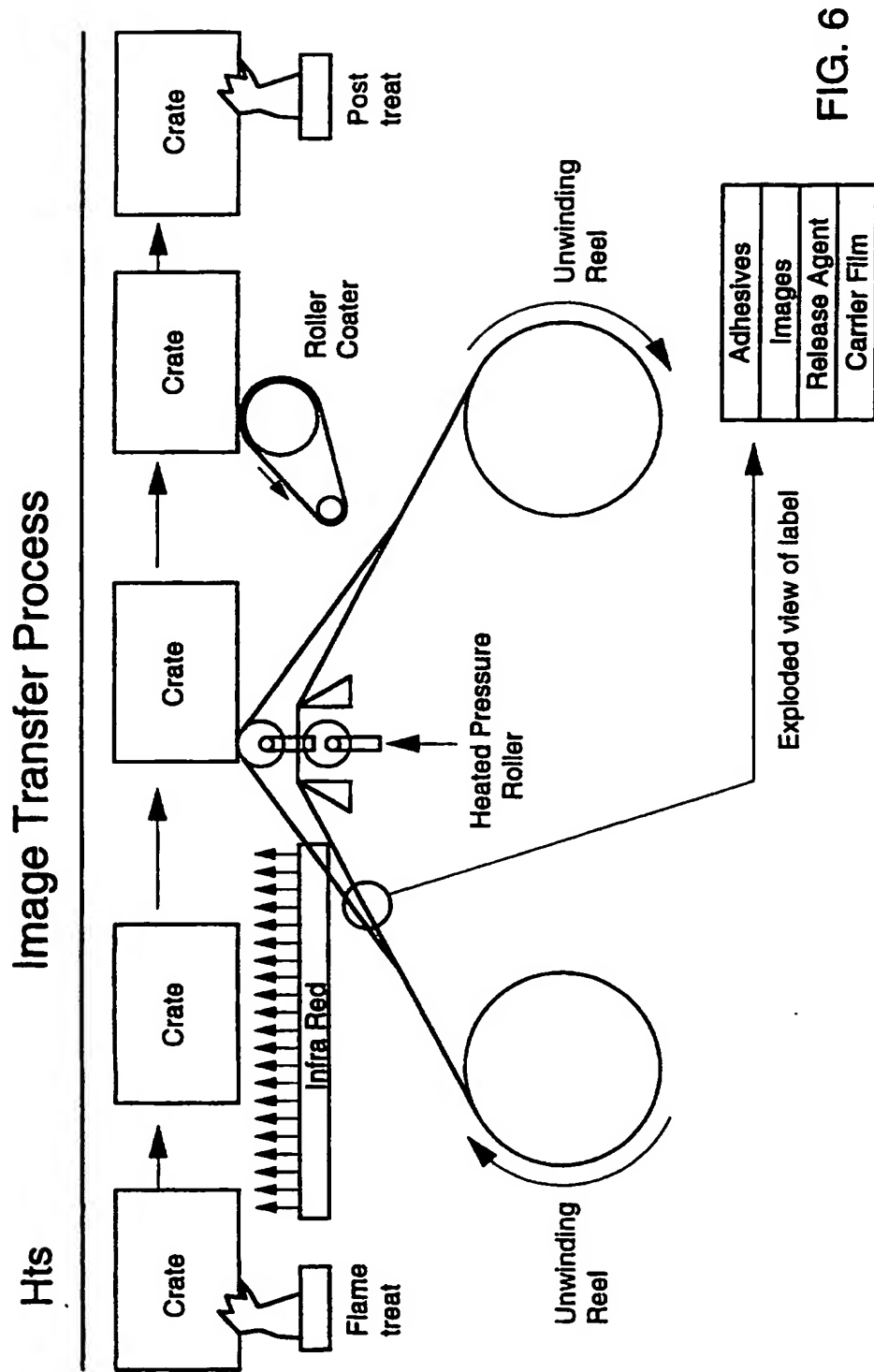
COATING APPLICATIONAPPLICATOR DETAIL

FIG. 4

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POST FLAME TREATMENT**FIG. 5**



**FIG. 6**

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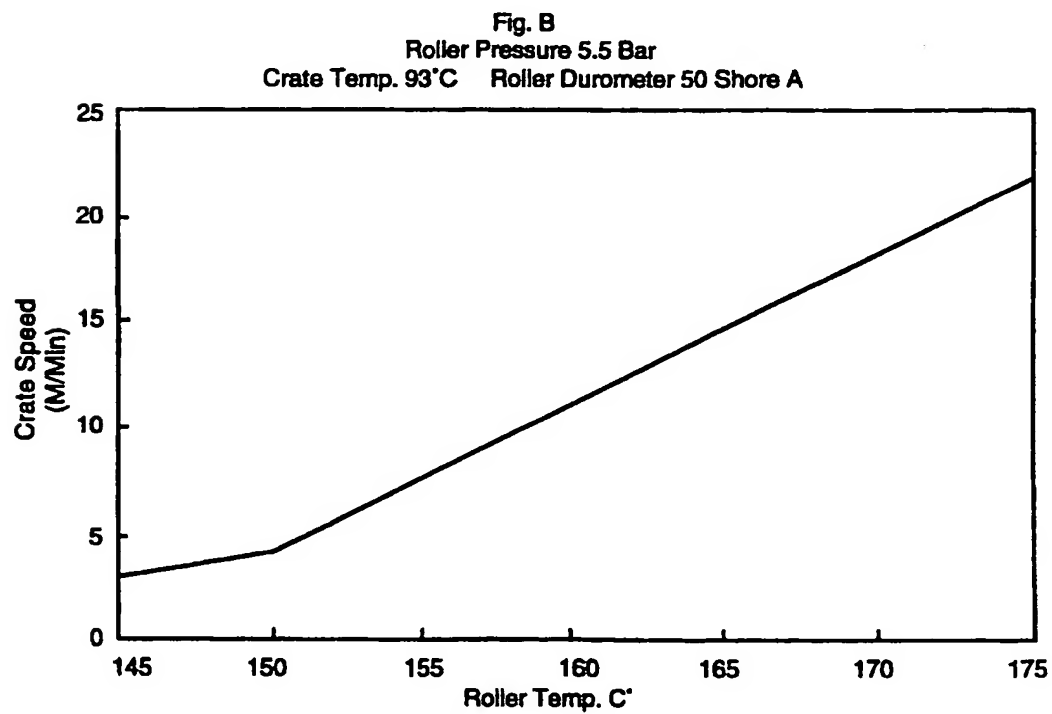
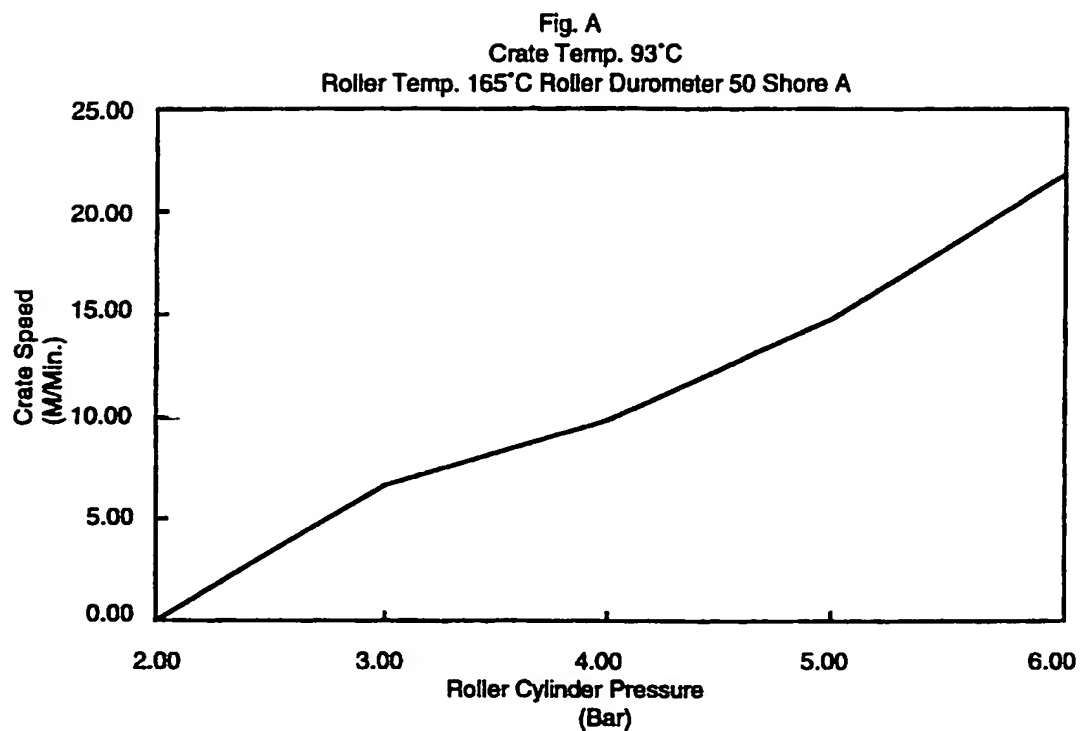


FIG. 7

# INTERNATIONAL SEARCH REPORT

Int. Application No  
PCT/NL 97/00140

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B65D25/20 B65C9/18

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B65D B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 094 912 A (DEIBIG ET AL) 10 March 1992	1,4,7,17
Y	see the whole document	2,3,5,8,16
X	WO 90 05088 A (BRANDT MANUFACTURING SYSTEMS) 17 May 1990	10,13,14
Y	see claims 7,11 see page 13, line 19 - line 23; figures	2,3,11,12,16
Y	US 5 104 719 A (KAMEN ET AL) 14 April 1992 see column 3, line 48 - line 59 see column 5, line 34 - line 37; figure	5,8,11,12

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

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Date of the actual completion of the international search

9 June 1997

Date of mailing of the international search report

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Smith, C

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 97/00140

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